SECTION FIVE

Teaching/Learning Statistics

General Overview

Students in our Caribbean schools are participants in a world that is rich in information. There is a constant need to structure this body of data, and to make decisions and draw conclusion from the information. Statistics provides an avenue for managing these data.

Statistics includes collecting, organizing, describing, displaying, and interpreting data. It also involves making predictions and judgments based on the collected data. For students, these processes are not only relevant, interesting and important for daily life; they constitute a real form of problem solving.

A variety of simple techniques for graphing and making sense of data are quite accessible to primary school students. These same techniques can be applied to the real world (Van de Walle, 1990). In addition, as students collect data, they see how prior knowledge about numbers, size, shape, and patterns relate to things around them. The more we can integrate real-life activities into classroom learning, the more students will be able to recognize the importance of what they are learning.

The Statistics content strand is divided into three main topics: Data collection, data representation, and data interpretation.

Data collection

Data collection involves the application of a variety of methods to gather information from people or the environment. It is a process by which students can make connections among mathematical concepts in a variety of content areas and in the real world. This process can also tap into students' natural curiosity about the outdoors, which offers a source of data collection experiences that are more challenging and engaging and that support learning.

At the Grade 5 -6 level, students will further develop their knowledge and skills related to observation, interviewing, and the use of simple questionnaires to collect data.

The emphasis will be on their decision-making process related to the use of these data collection methods as well as the actual use of the methods. As well, the students will be introduced to the mean as a statistic which may be used to describe data.

To develop your students' data collection capabilities, you should let them gather their own data. Data collection activities could focus on the students' interests, special events, and activities in your classroom, school, and community. As they collect data, the students can classify objects according to selected attributes. You should encourage them to create different ways of organising the data. This would help them recognize the variety of possibilities for collecting and categorizing data.

Guiding data collection

The following are some general activities that you can use with your students.

§ Analyse simple real-life situations that involve data collection. Let the students identify the data collection methods used in the situation and the questions that were asked.

§ Encourage the students to describe how they would collect the data to answer a given question. This description could include: the questions that they are going to ask and whom they would ask the questions, or where they would be able to obtain the data.

§ Encourage the students to talk about what happened while they were collecting the data. You may, for example, find out whether they asked questions other than what they had prepared or whether they were able to ask all of their questions.

<u>Data representation</u>

Data representation is important to statistical work because it gives the information visual form. Having exposed students to a variety of ways of collecting data, they will then need to be oriented to several ways of representing such data. Tables, pictographs, bar graphs and line graphs are the modes of representation that Grade 5 and 6 students will encounter. The students will learn that data can be displayed in different ways and that depending on the question being asked, one type of display might be more appropriate than another. Thus in representing data, the students will be expected to select appropriate methods. They will also be required to use appropriate scales in constructing their graphs.

Guiding data representation

The following are some general activities that you may use to guide your activities related to data representation.

§ Let the students look for examples of data representation in newspapers and magazines. Allow them to explain what the various graphs show, and the similarities and differences between the various types of graphs.

§ Let the students use different ways to represent the data that they collected. Encourage them to compare their different modes of data representation. Let them identify which of the various representations were more effective and why they were effective.

§ Using computer software, create different types of graphs and print them. Let the students compare and contrast the characteristics of the different types of graphs.

§ Encourage the students to use the data to make up problems.

Data interpretation

       Data interpretation focuses on the conclusions that can be drawn from a specific set of data. At the Grade 5 – 6 level, the students will be made aware that if the data are insufficient, incorrect conclusions may be made. They will be guided to develop a general idea of the conclusions that may be formed from a set of data. You can assist them in forming conclusions by asking leading questions. You may use the following list of questions to guide the development of the students' abilities to interpret data.

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Guiding data interpretation

§   One major question is:

'*What interpretations/ conclusions can we draw from the data?*'

An answer to this question may be obtained by considering the following questions.

1. Which set of objects has more or less?
2. What patterns can you see in the data?
3. What aspects of the data surprise you?
4. Are there sets of object with similar data?
5. Why is the data for one group different from the data for another group?
6. Are there any relationships among the data?
7. Is additional data needed?
8. Is there irrelevant data?

§   Another major question is:

'*How can we use our interpretations to make predictions?*'

An answer to this question may be obtained by considering the following question.

What additional data can you collect to find out if your conclusions are correct or incorrect?

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Note that you may not need to use all of the suggested questions in every situation. Sometimes it may be necessary to add or delete questions from the list. The idea is to be flexible and to adapt the questions to the context of the data interpretation exercise.

Outcome 8

Students should be able to:

Plan data collection activities.

Materials/resources: Talks by personnel from organisations involved in data collection.

Activities: Organise for some parents or other persons who work in an organisations that collect data to speak to the students on the methods that they use to collect data and reasons for selecting the particular methods.

Guide the students to use the information presented during the talks to prepare a set of questions or criteria that they could use to help them make decisions related to their data collection activities.

Guide the students to use the criteria to examine real life examples of data collection. For example they may evaluate how data are collected during a census.

Encourage the students to use the questions or criteria to plan how they will collect data to solve the problems or answer the questions that they have generated.

Outcome 18, 19

Students should be able to:

Read data presented in tables, pictographs, bar graphs, and line graphs.
Interpret data presented in tables, pictographs, bar graphs, and line graphs.

Materials: Examples of tables and graphs that the students have prepared; examples of tables and graphs from newspapers and magazines.

Activities: Place a large table that the students have prepared on the chalkboard. Guide the students to talk about the information that the table contains.
Ask the students questions about the data presented in the table; for example, you may ask questions related to the highest and lowest frequencies or you may ask the students to compare sets of data.
Let the students make up a list of questions related to the data presented in the table and answer these questions.

Repeat the activity, using other examples of tables and examples of the various types of graphs.

Let the students search magazines and newspapers for examples of the various types of tables and graphs that they have studied. Let them collect these examples and bring them to class.

In class, organise the students into groups. Let them examine the examples and describe how they are different from and similar to the tables and graphs that they have drawn. Encourage them to suggest reasons for the similarities and differences.

Guide the students to read the information presented in the tables and graphs. Let them make up questions related to the data and answer these questions.

Outcome 20

Students should be able to:
Calculate the mean/average of a set of data.

Materials: Marbles, shells, etc.

Activities: Ask the students to form sets of objects; for example five sets containing 1, 2, 3, 4, and 5 objects respectively.
Ask the students to evenly distribute the objects among the sets. Record this information on the chalkboard using diagrams.
Repeat the activity. Vary the number of sets to be formed and the size of the sets. Record the results on the chalkboard.

Indicate to the students that in redistributing the objects among the sets they found the mean/average of size of the sets.
Let the students examine the diagrams on the chalkboard and explore how they could use the number of objects in each set to obtain the number of objects in each of the evenly distributed sets.
Guide the students to consider the operations of addition, subtraction, multiplication or division.
Guide the students to note that they can add the number of objects in each set and divide by the number of sets.

Let the students test the procedure, using sets of data that they have collected. Let the students practice using the procedure.